

Impacts of the “Plastic Bag Law” in the Grocery Retail in the city of São Paulo/Brazil

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Abstract— Among the waste generated by retail, the plastic bag, which has its main use for the transportation of products, is a constant component of household waste and negatively impacts the environment. In this context, Municipal Law 15,374 prohibited the free distribution of plastic bags in the city of São Paulo / Brazil, as of April 2015, and brought as an alternative the use of returnable bags and biodegradable bags in an attempt to reduce environmental impact caused by improper disposal of the plastic. Therefore, the purpose of this research was to analyze the impact of said Law on the reduction of the purchase of plastic bags made by the grocery retail in the city of São Paulo. A survey was conducted with data from two grocery retail stores in the city of São Paulo, between January and December 2015. The results showed that the implementation of the law reduced the volume of plastic bags provided by supermarkets without compromising the flow of people and financial income.

Keywords— About five key words in alphabetical order, separated by comma.

I. INTRODUCTION

One of the main segments of the economy in Brazil, the retail supermarket represents a large part of the commerce sector, leading the sale of consumer products (Winandy & Gallardo, 2014). This position gives it a series of economic advantages as well as responsibilities, demanding from its managers new ways of acting and thinking about the organization, especially in the disposal of products and the production of household waste (Ceretta & Froemming, 2013).

The supermarket sector has been changing over the years for different reasons. Among them, it is possible to mention the great social concern related to the scarcity of natural resources, which determines a more sustainable

view for industrial and commercial activities (Parente & Gelman, 2006). In this sense, the sector is assuming new responsibilities towards the final consumer, committing itself to the reduction of waste generated, as well as to the recycling and reuse of waste (Braga Junior & Rizzo, 2014).

Among the residues produced by supermarkets, there are plastic, cardboard, pallet, organic waste and others, which come from the primary packaging of the products and the operational activities in general (Dias & Braga Junior, 2016). In particular, plastic bags, although not directly produced by retail, are passed on to consumers at the time of purchase, which are then destined for landfills with other types of household waste (RÉGIS et al. , 2015). In this way, besides being a producer, retail is also a supplier of household waste products (Ceretta & Froemming, 2013).

According to Fabro, Lidemann & Vieira (2007), the economic advantages of the common plastic are the same that incorporate a serious negative environmental aspect, such as its durability and resistance to degradation. Due to these characteristics, the inappropriate disposal of the bags negatively impacts the environment, since its decomposition process can take from 100 to 400 years (Santos et al., 2012). Such fact has been the motivation for the development of public policies and laws that promote reduction of the use of the plastic bags or even its banishment.

In this sense, in May 2011, the Municipal Law of São Paulo promulgated Municipal Law 15,374, which aimed to prohibit the free distribution or sale of plastic bags to consumers in all commercial establishments in the municipality and the region. After four years of sanctions, the recognized "Law of the Sacolinha" was regulated only in 2015, by Municipal Decree No. 55,827. In addition, this

law still provides that establishments should encourage the use of reusable bags and oblige them to affix informative signs of awareness to the use of these types of bags (Prefeitura Municipal de São Paulo, 2011).

In an environment of uncertainties and discussions about the possible effects of the implementation of said Law, this research seeks to analyze the impact of the so - called "Law of the Sacolinha" in the reduction of purchase of plastic bags made by the retail supermarket in the city of.

To achieve this objective, this work is divided into five parts. The first one, already presented, brings the contextualisation of the problem and the objective of the work. Subsequently, a literature review is done about the retail supermarket and the residues coming from this sector, especially on the plastic bags. In the third part is presented the methodological procedure, which adopted the multicase study. The results and discussion are described in Part Four. Finally, the final considerations of the work are carried out.

II. SOLID WASTE FROM RETAIL: PLASTIC BAG

Supermarkets produce various types of solid waste such as: plastic, cardboard, pallet, organic waste and others, which come from the primary packaging of the products and their operational activities in general (Dias & Braga Junior, 2016). Particularly in the case of plastic bags, although it is not a waste directly generated by retail, they are passed on to consumers at the time of purchase and are subsequently destined for landfills with other types of household waste (Régis et al. 2015).

The origin of the plastic bags came in the year 1970 and, due to its free distribution by the supermarkets and by the commerce in general, quickly became very popular and was incorporated into the consumer routine (Fabro, Lidemann & Vieira, 2007). A decade after its emergence, the use of plastic bags in Brazil was expanded, bringing with it several advantages of domestic utilities, due to their practicality, resistance and impermeability (Régis et al., 2015).

The economic advantages of common plastics that allow reuse, such as durability and resistance to moisture and chemicals, are the same as those that incorporate a serious negative environmental aspect (Fabro, Lidemann & Vieira, 2007). Due to these characteristics, the inappropriate disposal of the bags negatively impacts the environment, since its decomposition process can take from 100 to 400 years (Santos et al., 2012). This fact has motivated the development of public policies and laws that promote the reduction of the use of the plastic bags or even their banishment.

In this context, in May 2011, Municipal Law No. 15,374 was promulgated by the São Paulo City Hall, which sought

to prohibit the free distribution or sale of plastic bags to consumers in all commercial establishments in the municipality and in the region. After the law was established, a schedule of actions was foreseen until the banalization of the bags in the region of São Paulo. However, in February 2012, the Office of the Consumer Prosecutor of the Capital of São Paulo prepared a TAC, with legal force, in which it determined that the market networks had the responsibility to inform the consumer about the eradication of the supply of bags during the period of 60 days, deadline for the supply of the bags. After the deadline, 04/04/2012, the bags are no longer supplied. However, a little more than two months after the banalization of its supply, it was determined by the courts to return free distribution of the same to the consumers of supermarkets in the municipality, which invalidated the entire process of extinction of its use (Régis et al. 2015).

After four years of sanctions, the so-called "Law of Sacolinha" was effectively regulated in 2015, through Decree nº 55.827. This law establishes that commercial establishments should encourage the use of reusable bags instead of plastic ones and oblige them to affix informative signs of awareness to the use of these types of bags (Prefeitura Municipal de São Paulo, 2011). In addition, it is allowed to supply, free of charge or by charge, reusable bags, the specifications of which are defined by the Municipal Urban Cleaning Authority (AMLURB) in Resolution 55 / AMLURB / 2015, the permitted models of which are translated into green bags and gray bags. Commercial Association of São Paulo, 2016).

It should be noted that the use of bags produced by other materials, such as biodegradable, degradable, paper or reusable bags, is an alternative to plastic bags, however, whatever the chosen alternative, the associated environmental impact still exists. Therefore, Santos et al. (2012) argue that sustainable consumption is based on two pillars, which have less impact on the environment. The first pillar is to reduce the generation of waste in the smallest amount possible, followed by a better disposal of the same, so that they generate smaller impacts. Recycling is the second pillar of sustainable consumption.

According to Fabro, Lidemann & Vieira (2007), it is estimated that the annual production of plastic bags in Brazil is approximately 210 thousand tons, which represents 9.7% of all the garbage in the country. According to the authors, when placed in the environment, this material prevents the passage of water, delaying the decomposition of biodegradable materials and making it difficult to compel debris.

According to data from the Business Commitment for Recycling (2015), "the more developed the country is, or the higher the social class, the smaller is the proportion of compostable organic wastes and greater than that of

recyclables (paper, cardboard, glass, metals and plastics)". In Brazil, about 5% of urban solid organic waste generated was recycled / composted in 2012. These organic components account for about 50% of the weight of waste collected. While in India this index is 68%, in the United States and France, this index represents respectively 12% and 32% (Business Commitment to Recycling, 2015).

With regard to the plastic recycling index, Brazil reached an index of 21.7% in 2011, representing approximately 953 thousand tons per year. Sweden (53%), Sweden (33.2%), Belgium (29.2%) and Italy (23.5%) followed Sweden. In the United States 28.6 million tons of plastic waste were discarded, of which 2.4 million tons were recycled (Business Commitment to Recycling, 2015).

According to Marchi (2011, p.127-128), the selective collection is practiced in approximately 56.9% of the Brazilian municipalities, however, it is still not very developed and presents obstacles regarding the separation of garbage made by society. Usually, organic and inorganic wastes are mixed. Thus, it is necessary to increase investments in incentive programs and population awareness so that the separation is carried out correctly. Due to this bottleneck, recycling becomes difficult. In this context, environmental education plays an important role in raising awareness of environmental problems and, consequently, contributes to avoid the incorrect disposal of both plastic bags and other materials (Santos et al., 2012).

III. METHODOLOGY

With the objective of analyzing the impact of Municipal Law 15,374/2011 on the reduction of the purchase of plastic bags in the retail supermarket in the city of São Paulo, a multicase study was carried out (Yin, 2015). We searched two supermarkets in the city, which, under request of non-identification by the managers (interviewed), will be called "Retail 1" and "Retail 2". For these objects of analysis, the quantities of plastic bags purchased and kept in minimum stock, before and after the implementation of the law, were observed, covering the period from January to December 2015.

For the basis of this work, a bibliographical research was carried out on the topics: supermarket retail and solid retail waste, in particular the plastic bags. The qualification of the concepts, through bibliographical research, consolidates the conceptual foundation of the work, conducting an investigation on the theoretical precepts developed throughout the article (Cooper & Schindler, 2003). This research created support and validation for what was intended to be demonstrated with the practical cases and results achieved.

In this way, a qualitative, descriptive and exploratory research was carried out, based on the data provided by the

research objects. The data analyzed were the number of bags purchased, the minimum quantity kept in stock, the purchase cost and the average ticket of the supermarkets during the analyzed period. The average ticket was evaluated before and after the implementation of the Law, in order to identify if there was any change in store revenue due to the reduction of the supply of bags (Cooper & Schindler, 2003; Mattar, Oliveira & Motta, 2014).

Data were obtained through unstructured interviews with supermarket owners. These were treated and analyzed in order to make a comparison among supermarkets regarding the interference of Municipal Law 15,374 in the purchase of plastic bags. In this aspect, we analyzed the quantities of bags purchased and the cost of this purchase, which allowed us to identify whether, with the implementation of the law, there was a reduction both in the number of bags purchased and in the reduction of the cost spent for this purpose.

IV. RESULTS AND DISCUSSIONS

The supermarket sector is directly and indirectly involved in the production of urban waste and, thus, contributes to the environmental impact. Therefore, in an interview with the supermarket managers analyzed, both affirmed collaborating with environmental issues on issues related to the disposal of recycled and organic waste produced by the company. The disposal of solid waste, such as plastics and cardboard, is carried out by selling them to recycling companies. As for organic waste, specifically fruit and vegetable products, such as fruits and vegetables, are discarded with an institution that reuses them as organic fertilizer.

4.1. Retail 1

According to the definition of the Brazilian Association of Supermarkets (ABRAS), Retail 1 falls within the concept of a compact supermarket, since it contains 6 checkouts. Its physical structure is located in a less peripheral region with less population density than Retail 2, and has an average annual ticket of approximately US\$ 15.00.

As can be seen in Table 1, after the effective establishment of Municipal Law 15,374 occurred in 2015, there was a significant reduction in the purchase of plastic bags by Retail 1, from 40,000 units acquired, in the month prior to the law, to the minimum quantity of 7,000 units in the subsequent months.

From the collected data, it is identified that, in addition to a reduction in the quantity of bags purchased, there was also a gradual reduction in the minimum stock of the same, as well as in the average purchase cost. Thus, Figure 1 shows the relationship between the purchase of plastic bags, the cost of purchase and its minimum stocks of Retail 1 during the year of implementation of the Law.

Table.1: Supply of bags, cost, minimum stock and average ticket of Retail 1 - Jan. to Dec./ 2015.

Month	Supplying bags	Total Cost	Minimum stock	Average ticket
January	40000	\$352.94	12000	\$ 10.32
February	40000	\$352.94	12000	\$ 10.89
March	40000	\$352.94	12000	\$ 11.24
April	20000	\$176.47	12000	\$ 14.09
May	10000	\$235.29	6000	\$ 13.27
June	8000	\$188.24	3000	\$ 13.87
July	7000	\$164.71	2400	\$ 13.00
August	7000	\$164.71	2100	\$ 14.70
September	7000	\$164.71	2100	\$ 11.46
October	7000	\$164.71	2100	\$ 14.19
November	7500	\$176.47	2100	\$ 14.92
December	7500	\$176.47	2250	\$ 17.74

Fig. 1 shows the great reduction in the supply and the stock of plastic bags of the supermarket (Retail 1), in the order of 82% in both variables. According to the interviewee, this reduction was due to the incentive to reuse cardboard boxes instead of plastic bags, and to start selling reusable bags, which are larger and more resistant to transporting products. In addition, it can be seen that

the period of greatest fall occurred between April and June 2015, with a subsequent stabilization in both acquisition and inventory. According to reports from the store manager, the first few months after the implementation of the legislation were adaptive. For this reason, the months of April, May and June present slightly larger quantities of plastic bags.

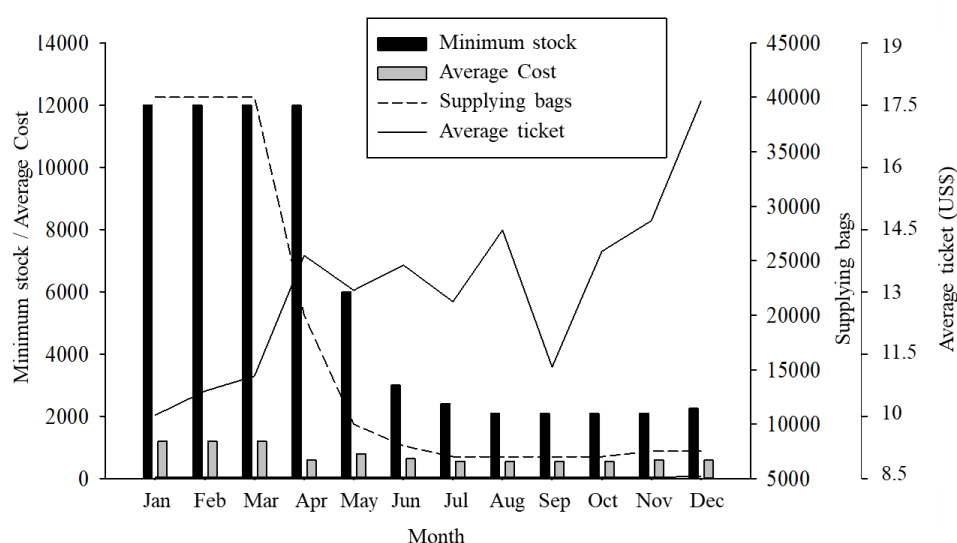


Fig. 1: Supply of plastic bags of Retail 1 - Jan. to Dec./ 2015

It can be verified that there was no relation between the value of the average ticket of the store and the implementation of said legislation. It is stated, therefore, that the implementation of the law did nothing to interfere with the sales of the supermarket under analysis. The largest fall and high variation of the average ticket occurred, respectively, in the months of September and December. According to the manager, this variation is related to the seasonality present in some months and food groups.

With regard to the cost of buying bags, it is observed that this one had a significant fall after the prohibition of the

use of bags in the retail in general. After the implementation of the law, the material used to produce the packaging was replaced by a more sustainable one, in a way that changed production processes and increased production costs. The fact was also reflected in the price of the bags, which in the period prior to the legislation was US\$ 0.009 per unit, and, as of April, started to cost US\$ 0.024, an increase of 166%.

In spite of the significant increase in the value of the plastic bag after the mandatory of the law, the total cost spent with this item by Loja 1 had a great reduction, due to a reduction of approximately 80% in the quantity of

supply. This fact contributed to the reduction of about 50% of costs, from July to October.

In summary, it was evidenced that, from the perspective of the company, the implementation of the law did not negatively impact the business, since the average ticket did not change and the costs with the purchase of plastic bags were reduced significantly.

4.2. Retail 2

With 11 checkouts, Retail 2 is in the group of conventional supermarkets, according to ABRAS definition. During the analyzed period, it presented an

average annual ticket of approximately US\$ 20.59. In comparison to Retail 1, this retail is located in a region of greater population density. Due to its larger structure, this store also presented larger quantities of bags and minimum inventory. Thus, Table 2 shows the number of bags that were supplied, the average total cost of shopping for bags, the minimum inventory and the average monthly ticket of Retail 2, comprised between January and December 2015.

Table.2: Supply of bags, cost, minimum stock and average ticket of Retail 1 - Jan. to Dec./ 2015.

Month	Supplying bags	Total Cost	Minimum stock	Average ticket
January	60000	R\$529.41	18000	R\$14.46
February	60000	R\$529.41	18000	R\$15.26
March	60000	R\$529.41	18000	R\$15.76
April	25000	R\$220.59	18000	R\$19.18
May	23000	R\$541.18	7500	R\$20.14
June	20000	R\$470.59	6900	R\$18.87
July	20000	R\$470.59	6000	R\$19.38
August	20000	R\$470.59	6000	R\$20.00
September	20000	R\$470.59	6000	R\$18.54
October	20000	R\$470.59	6000	R\$19.89
November	20000	R\$470.59	6000	R\$20.91
December	20000	R\$470.59	6000	R\$24.87

Prior to the enactment of Law 15,374, the purchase of plastic bags was stipulated by consumption trend data from the previous month. In Fig. 2, it is observed that the supply of bags decreased after the implementation of the legislation. The purchase of bags increased from 60,000 to 20,000 units in subsequent months, corresponding to a reduction of approximately 66%. The same happened with the minimum inventories of this item, which presented the same reduction percentage.

Fig. 2 showed that the average ticket did not show changes after the implementation of the legislation, since the changes in it are justified by the consumption trend and by seasonal seasons, as evidenced by Retail 1.

In relation to the average cost of buying plastic bags, it is observed that this presented a small reduction compared to Retail 1, since this was approximately 11%. This was due to the increase in the price of the bags. Considering

that the bag supplier is the same for both stores, the 116% increase in its price has had a more significant impact on Retail 2 under review. Thus, despite the reduction of more than 60% in the number of bags purchased, the average monthly costs did not show much variation, going from US\$ 529.41, before the law, to US \$ 470.59 in the months after the Law.

Due to the size of the store and the large influx of people, the amount of cardboard boxes was not enough to heal the demand in place of the plastic bags. Thus, customers should purchase the traditional bags, worth US\$ 0.024 a unit, or could invest in returnable bags, sold at US\$ 0.88 a unit. Due to the large price difference, many customers preferred to invest in plastic bags to returnable bags. Thus, the reason for the reduction in smaller proportions of the supply of bags compared to Retail 1 is explained.

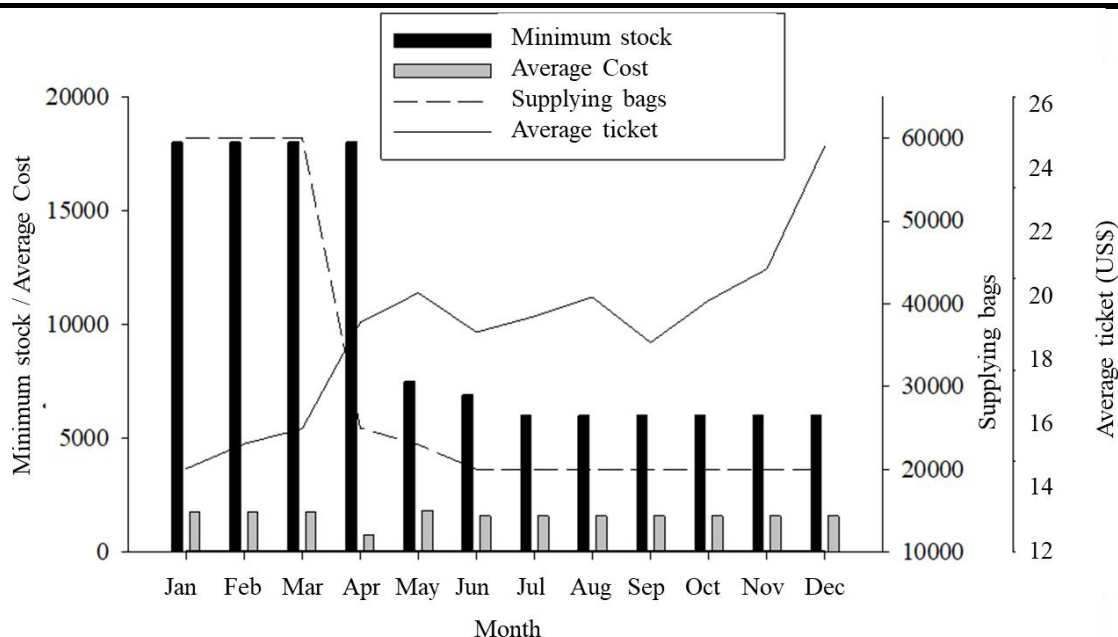


Fig. 2: Supply of plastic bags of Retail 1 - Jan. to Dec./ 2015

Finally, it can be said that although Retail 2 complied with the legislation regarding the reduction of the use of plastic bags by eliminating the free distribution of the same, the financial aspects did not present significant changes, since, to meet the demand, the retailer needed continue to acquire a large number of bags during the period of adaptation to legislation. In this way, the change in the price of them impacted more intensely in this store, due to its size and flow of customers.

V. CONCLUSION

Municipal Law No. 15,374 of May 2011, implemented by the Municipal Government of São Paulo from Municipal Decree No. 55,827, in January 2015, brought significant changes to the sector of supermarkets and commerce in general. This legislation established the effective prohibition of the sale or distribution of plastic bags in commercial establishments in the municipality of São Paulo and region, as of April 5, 2015.

During the process of adaptation to legislation, the two supermarkets analyzed showed significant changes in the supply of plastic bags, in the cost of purchasing them and in their minimum stocks, as of April 2015, the month of enactment of the legislation in question. It was identified that retailers needed to adapt sales by providing cardboard boxes and other alternatives instead of custom plastic bags.

It was evidenced that due to Retail 1 being smaller and having a smaller flow of people, the changes imposed by the legislation had a significant impact on business, but in a positive way. In this sense, it was observed that the supply of bags was reduced by 82% and the cost for

supply fell by 50%, even though there was a 116% increase in its price.

With regard to Retail 2, because of its greater physical structure and flow of people, the advantages of implementing legislation were felt with greater difficulty to the business. The reduction in the supply of bags was evident and significant, approaching 67%. However, the cost of buying plastic bags was reduced by only 11%. Thus, the increase in the price of plastic bags was more impacting in this store. This fact was due to the establishment not being able to supply the transport demand of the customers through cardboard boxes and other alternatives replacing the plastic bags.

As final considerations, it is argued, from the results of this research, that Municipal Law no. 15,374 impacted retail supermarket, according to the size of the establishment and its respective flow of people. In order to reduce the environmental liabilities generated by plastic waste, it is proposed in this work, in a complementary way, the promotion of campaigns to encourage the replacement of plastic bags, and to provide incentives to retailers, so that the replacement of the bags will benefit all types and sizes of establishments. In addition, it is stated that the strengthening of environmental education programs would also serve as a complement, since the problem of inadequate disposal of plastic bags begins in retail and ends with consumer attitudes.

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